UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 2366

MSAS NO. 110

OVER THE

MISSISSIPPI RIVER

DISTRICT 2 - BELTRAMI COUNTY, CITY OF BEMIDJI

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 3512 (CEI 34)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 2366 were found to be in good (East and West Abutments) to satisfactory (Piers 1 and 2) condition with no defects of structural significance. The concrete deterioration at the piers has progressed since the previous inspection, but overall has still not appreciably compromised the structural integrity of the structure. The channel bottom around the substructure units was well established and in stable condition with no evidence of significant scour and no appreciable changes since the previous inspection.

INSPECTION FINDINGS:

(A) Moderate to heavy scaling was present around much of the perimeter of the piers in a horizontal band typically located between 2.5 feet above and 2 feet below the waterline, with typical penetrations of 3 to 4 inches and maximum penetrations of 6 to 9 inches.

(B) Below water (below the band of scaling described in A), the concrete of the piers exhibited only light scaling and random locations of poor consolidation and section loss with penetrations of up to 1 inch.

(C) Map cracking, hairline to 1/16-inch-wide in size, and rated impending spalls were observed from the waterline to 4.5 feet below the waterline at both piers and both abutments.

(D) A moderate amount of debris, including timber drifts, assorted garbage, and a shopping cart, was observed on the channel bottom between the West Abutment and Pier 1.

RECOMMENDATIONS:

(A) Although the present extent of pier deterioration has yet to significantly compromise structural integrity, the deterioration has and will continue to progress. If long term serviceability is desired for the structure, consideration should be given to removing all unsound concrete and restoring concrete surfaces by patching and recasting with a concrete mix designed for high durability and low permeability.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 2366

Feature Crossed: The Mississippi River

Feature Carried: MSAS No. 110 - 1ST Street

Location: District 2 - Beltrami County, City of Bemidji

Bridge Description: The bridge superstructure consists of three concrete arch spans. The superstructure is supported on two reinforced concrete abutments and two reinforced concrete piers. The piers are numbered 1 and 2, from west to east. No design drawings with foundation details were provided.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 28, 2002

Weather Conditions: Cloudy, ± 65° F

Underwater Visibility: ± 2.0 Feet

Waterway Velocity: ± 1.0 fps

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2, and the East and West Abutments.

General Shape: Piers consist of oblong rectangular shafts with rounded ends. Abutments consist of vertical walls.

Maximum Water Depth at Substructure Inspected: Approximately 5.5 feet.

4. WATERLINE DATUM

Water Level Reference: Top of parapet wall on the North end of Pier 1.

Water Surface: The waterline was approximately 18.2 feet below the reference. Assumed Waterline Elevation 81.8.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

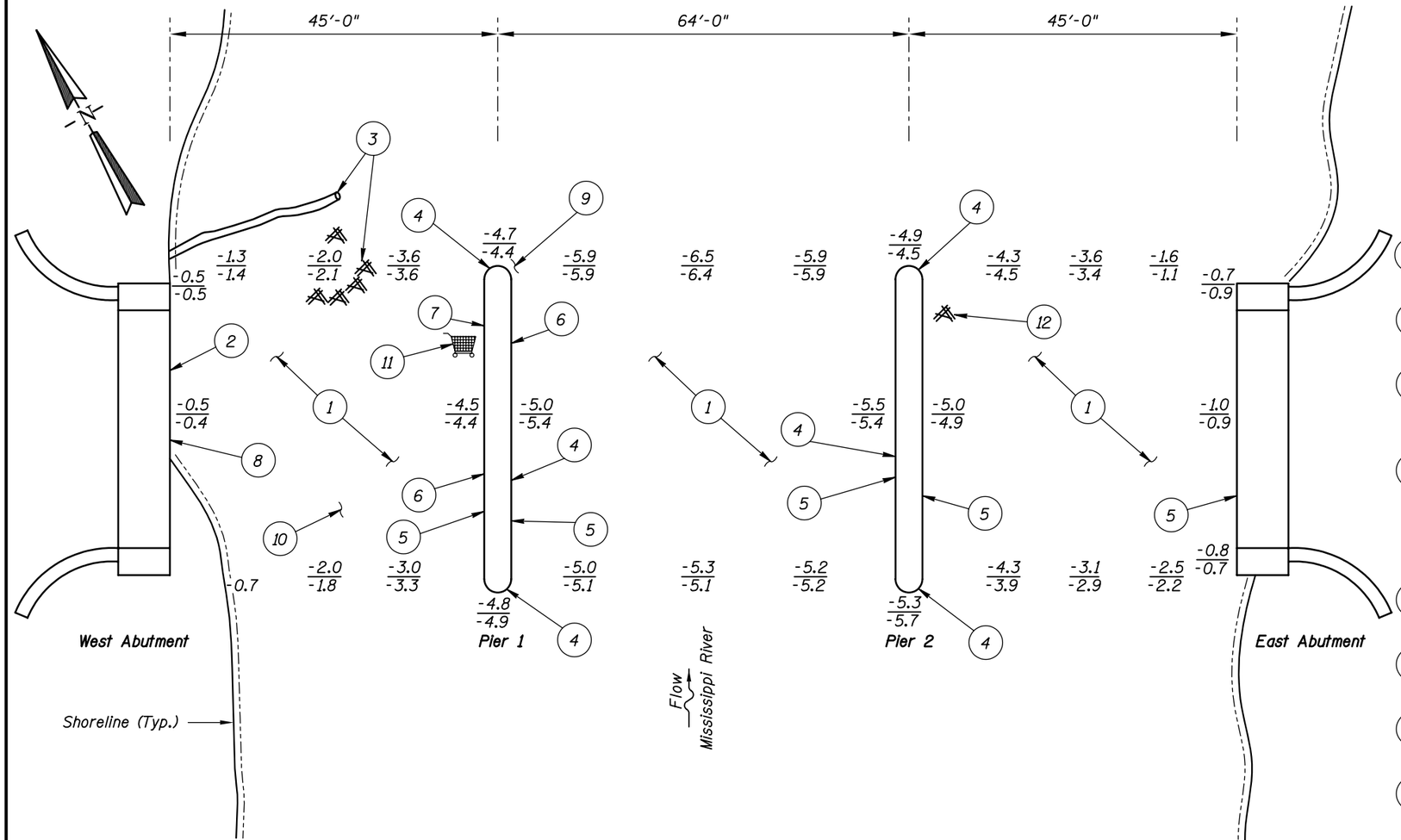
Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/02

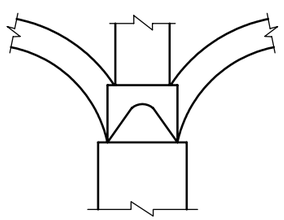
Item 113: Scour Critical Bridges: Code G

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes ___X__ No



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. The East and West Abutments, and Piers 1 and 2 were inspected underwater.
2. At the time of inspection on August 28, 2002, the waterline was located approximately 18.2 feet below the top of the parapet at the upstream end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 81.8.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

(1) The channel bottom material consisted of firm sandy gravel and cobbles with 2 to 3 inches of probe rod penetration.

(2) Below water concrete was in good condition with a light layer of aquatic growth and no defects of structural significance observed.

(3) A moderated accumulation of timber debris, including a 20-foot-long by 1-foot-diameter log, was observed extending from the West Abutment to the downstream end of Pier 1.

(4) Band of scaling, spalling, and section loss around both piers typically located between 2 feet below and 2.5 feet above the waterline, with typical penetrations of 3 to 4 inches and maximum penetrations of 6 to 9 inches. The heaviest deterioration was located around the upstream pier noses and the middle sections of the east side of Pier 1 and the west side of Pier 2.

(5) Map cracking, hairline to 1/16-inch-wide, and impending spalls were observed from the waterline to 4.5 feet below the waterline.

(6) A hairline vertical crack with efflorescence was observed extending from the waterline to the channel bottom.

(7) Area of section loss, 3 feet long by 1 inch high was observed 3 feet below the waterline with 2 inches of maximum penetration.

(8) Random hairline to 1/16-inch-wide map cracking with light amounts of efflorescence were observed from the waterline to 3 feet above the waterline.

(9) Random accumulations of riprap observed at the downstream nose of Pier 1.

(10) A moderate accumulation of assorted garbage (broken glass/bottles, etc.) was observed on the channel bottom between the upsteam end of Pier 1 and the West Abutment.

(11) Shopping cart was observed on the channel bottom.

(12) 8-inch-diameter log was observed on the channel bottom.

Legend

-5.0 Sounding Depth from Waterline (8/28/02)
-5.1 Sounding Depth from Waterline (8/26/97)

Timber Debris

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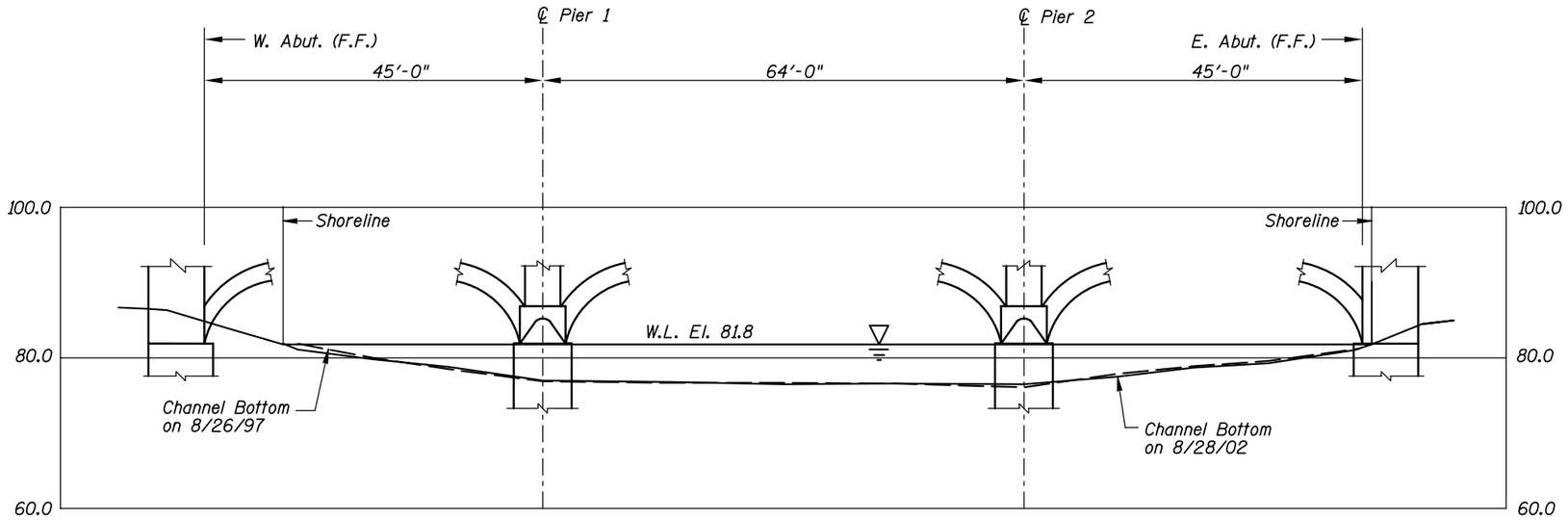
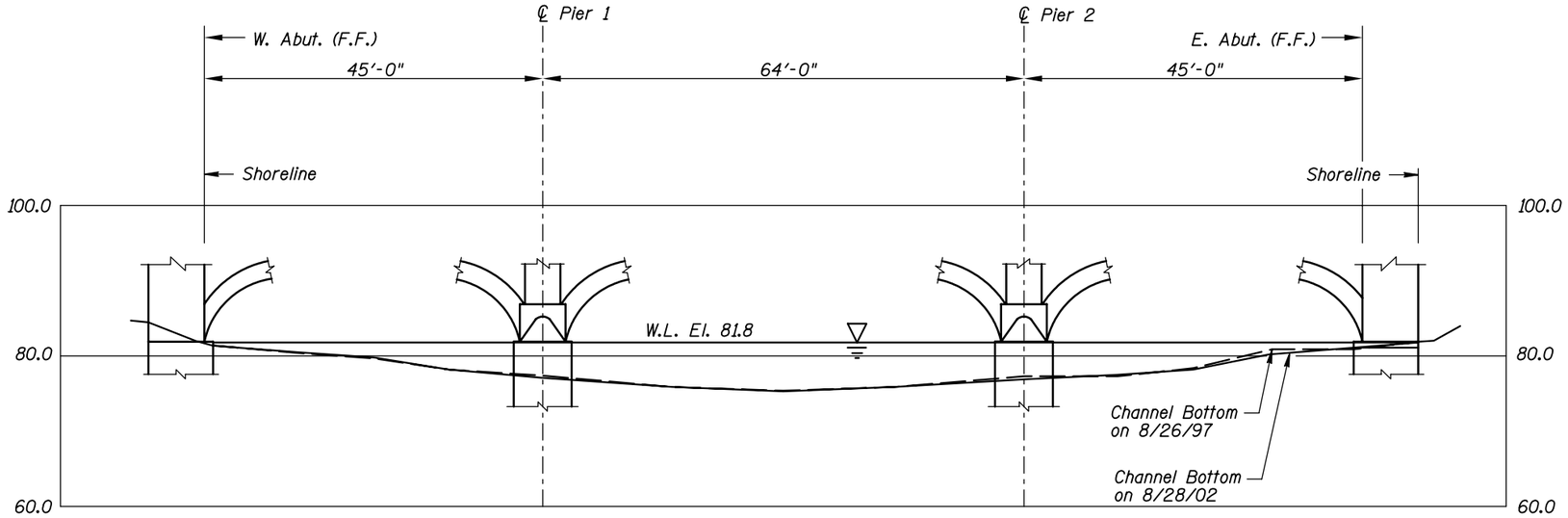
OVER THE MISSISSIPPI RIVER
DISTRICT 2, BELTRAMI COUNTY, CITY OF BEMIDJI

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35120034		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

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UNDERWATER BRIDGE INSPECTION

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UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=20'
Code: 35120034		Figure No.: 2

Photograph 1. Overall View of Structure, Looking North.

Photograph 2. Overall View of Pier 1, Looking Southwest.

Photograph 3. View of Pier 2, Looking Northeast.

Photograph 4. View of Spall in Spandrel Arch at Pier 1, Looking Southwest.

Photograph 5. View of the Downstream Nose of Pier 1, Looking Southwest.

Photograph 6. View of the Upstream Nose of Pier 1, Looking Northeast.

Photograph 7. View of the Upstream Nose of Pier 2, Looking Northeast.

Photograph 8. View of the East Face of Pier 2, Looking Northwest.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 28, 2002
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.
BRIDGE NO: 2366 WEATHER: Cloudy, ±65° F
WATERWAY CROSSED: The Mississippi River
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
OTHER
PERSONNEL: Michelle D. Koerbel, Matthew J Lengyel
EQUIPMENT: Scuba, U/W Light, Scraper, Lead Line, Probe Rod, Camera
TIME IN WATER: 11:15 A.M.
TIME OUT OF WATER: 12:00 P.M.
WATERWAY DATA: VELOCITY ±1.0 fps
VISIBILITY ±2.0 feet
DEPTH 5.5 feet maximum at Pier 2
ELEMENTS INSPECTED: Piers 1 and 2, East and West Abutments
REMARKS: Overall, the concrete below water was in good to satisfactory condition with minimal deterioration. The majority of the deterioration was located from 2.5 feet above the waterline to 2 feet below at the upstream noses, and to 6 inches below the waterline along the middle portion of the piers on the channel side. Typical penetrations for the section loss ranged between 3 and 6 inches with maximum penetrations of 9 inches around the upstream pier noses. Other defects included random map cracking with efflorescence and some related impending spalls just above the waterline extending below water. A moderate accumulation of debris, including timber drift, assorted garbage, and a shopping cart was observed on the channel bottom between the West Abutment and Pier 1.

FURTHER ACTION NEEDED: _____ YES ___X___ NO

Monitor the extent of the section loss during future inspections, and if found to be significantly progressing, repairs may be warranted to ensure long term serviceability at that time.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 2366
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491
WATERWAY CROSSED The Mississippi River

INSPECTION DATE August 28, 2002

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BRACING)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	5.0’	N	6	N	9	N	6	8	N	N	6	7	6	N	N	6	N	N
	Pier 2	5.5’	N	6	N	9	N	6	8	N	N	7	8	6	N	N	6	N	N
	East Abutment	1.0’	N	7	N	9	N	7	8	9	N	N	8	7	N	N	N	N	N
	West Abutment	0.5’	N	7	N	9	N	7	8	9	N	N	8	7	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete below water was in good to satisfactory condition with minimal deterioration. The majority of the deterioration was located from 2.5 feet above the waterline to 2 feet below at the upstream noses, and to 6 inches below the waterline along the middle portion of the piers on the channel side. Typical penetrations for the section loss ranged between 3 and 6 inches with maximum penetrations of 9 inches around the upstream pier noses. Other defects included random map cracking with efflorescence and some related impending spalls just above the waterline extending below water. A moderate accumulation of debris, including timber drift, assorted garbage, and a shopping cart was observed on the channel bottom between the West Abutment and Pier 1.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.